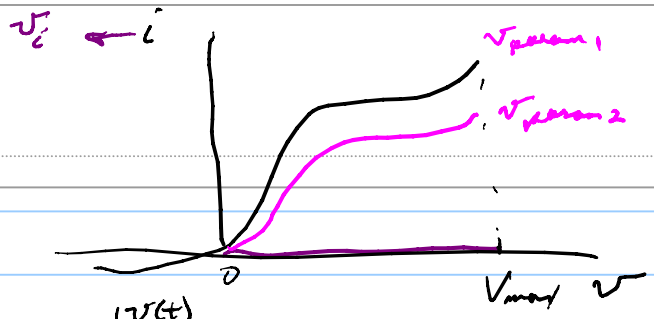
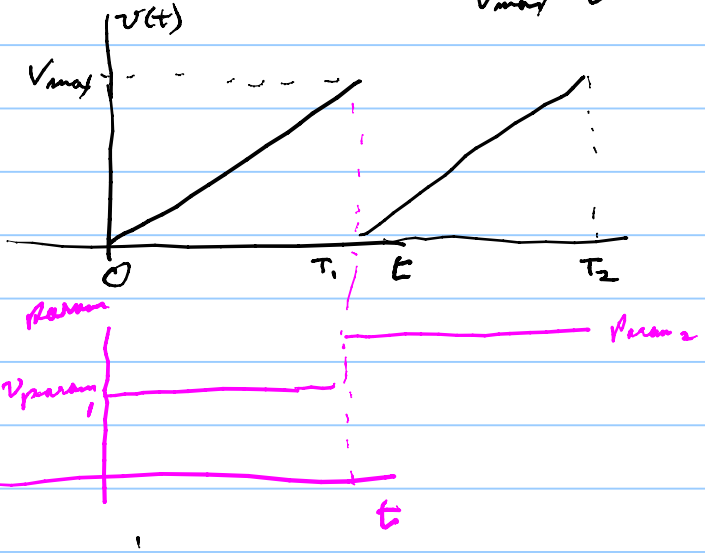
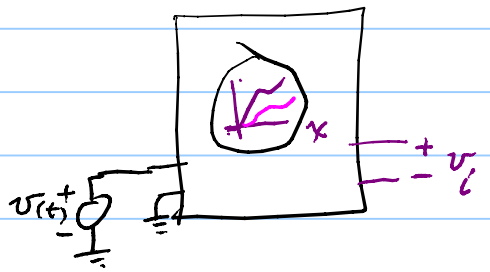
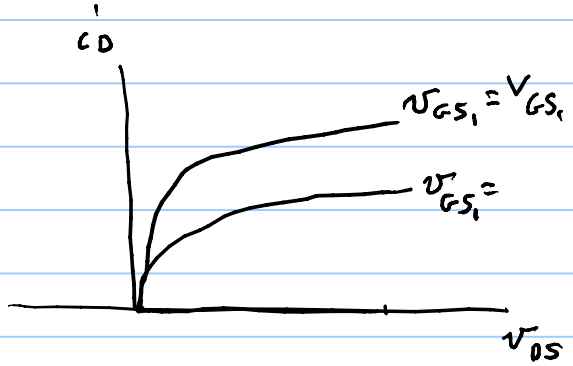
EE303
02/07/08

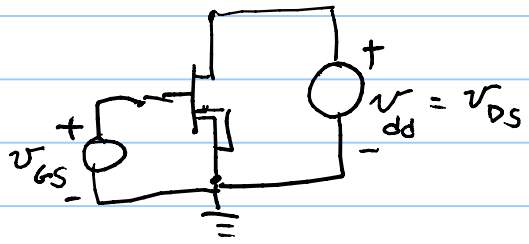
Note Title 2/7/2008

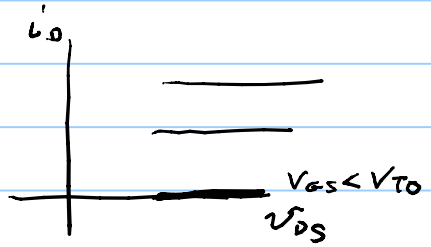












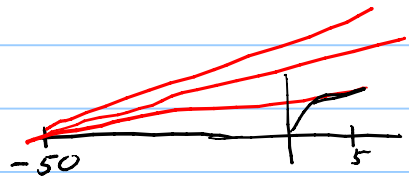
$$i_D = \frac{KP}{2}\frac{W}{L}(v_{GS} - V_{TO})^2(1+\lambda v_{DS})$$

for mm nmos transistor

$KP = 5.05 \times 10^{-5}$ amp/volt^2

$V_{TO} = 0.858$ volt

$\lambda = 1.84 \times 10^{-2}$ $\frac{1}{\text{volts}}$



for any fixed V_{GS}, $i_D = 0$ @ $v_{DS} = -\frac{1}{\lambda} \approx -50V$ = Early voltage

If $W = L = 10\mu = 10u$ $u = \mu$ = micron = 10^{-6} meter

reasonable range $v_{GS} \simeq 5$ v., v_{DS} to put in saturation

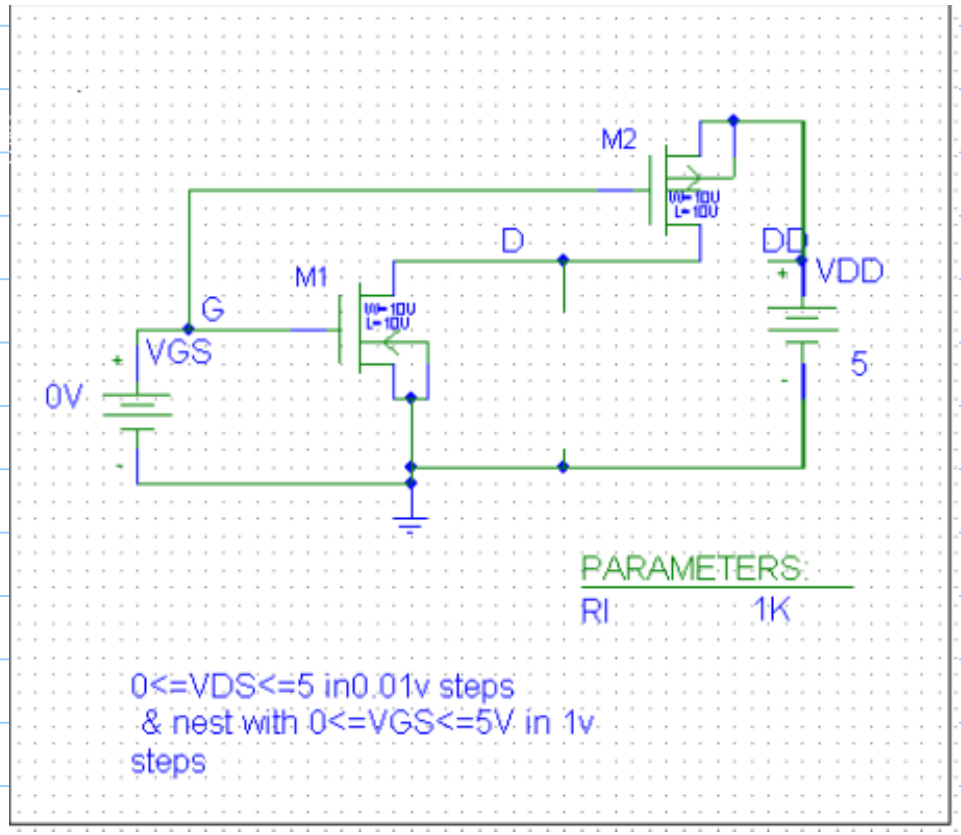
$v_{GS} - V_{TO} \leq v_{DS}$ (say > 4)

$$I_D = \frac{KP}{2} \cdot \frac{W}{L} (v_{GS} - V_{TO})^2 \simeq \frac{KP}{2} \times \frac{10}{10} (4)^2 \simeq \frac{KP}{2} \times 16 = 8 \times KP$$

$$\simeq 5.05 \times 8 \times 10^{-5} \simeq 50 \times 10^{-5} \text{ amps} = 0.5 \times 10^{-3} \text{ amps}$$

$$\simeq \frac{1}{2} \text{ ma.}$$

The region changes from ohmic to saturation when $v_{DS} \geq v_{GS} - V_{TO}$



an inverter
when fix V_{DD}
& sweep V_{GS}
& monitor V_{DS}

to get transistor
curves & load
line insert V_{DS}
source & sweep
it